(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: 0 428 380 A1

(12) EUROPEAN PATENT APPLICATION

(21) Application number: 90312378.9

(51) Int. Cl.⁵: A61M 15/00

(22) Date of filing: 13.11.90

The title of the invention has been amended (Guidelines for Examination in the EPO, A-III, 7.3).

(30) Priority: 14.11.89 GB 8925707

(43) Date of publication of application: 22.05.91 Bulletin 91/21

(84) Designated Contracting States: BE CH DE DK ES FR GB IT LI NL SE

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(54) Inhalation device and protective casing.

(57) An inhalation device comprising:
(i) an inhaler (13) including a housing which comprises a mouthpiece and actuation means to prevent dispensing from the reservoir until a patient is ready to inhale through the mouthpiece, and,
(ii) a protective casing (1) surrounding the inhaler, the casing comprising a body portion (2) and a moveable cover (3) which may be displaced to allow a patient access to the mouthpiece to use the inhaler, causing relative movement of the inhaler (13) and a blasting means (15) within the protective casing (1) thereby cocking the inhaler ready for use, characterised in that the cover (3) is pivotably attached to said casing (1) and a cocking link (7) is pivotally mounted at one end (9) to the cover and has a portion (9,10) in pivotal engagement with the inhaler or blasting means, whereby opening of the cover causes movement of the cocking link (7) and inhaler (13) relative to the blasting means (15), such that the pivot points (9,17) of the cocking link (7) and the pivot point of the cover to the casing (5) pass through a straight line position to an overcentre position at which the inhaler device is cocked.

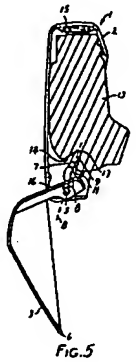

FIG.5

DEVICE

This invention relates to medical inhalers, and in particular to an improvement to the protective casing surrounding a metered dose inhaler, the casing comprising a body portion and a moveable cover which, when displaced to allow the patient access to the device, acts as a cocking lever for the priming of the inhaler.

Medical inhalers comprising an aerosol vial containing propellant and medicament and equipped with a dispensing valve, e.g., a metered dose valve communicating with a mouthpiece, are known. Such inhalers may be incorporated in a housing including a breath actuated mechanism to synchronise dispensing of the medicament with inspiration by the patient. An example of such a device is commercially available from Minnesota Mining and Manufacturing Company, under the trade mark AUTOHALER and is disclosed, for example, in European Patent No. 147028.

Co-pending European Patent Application No. 90309239.3 discloses an inhalation device comprising:

(i) a breath-actuated inhaler comprising a medicament reservoir mounted within a housing which comprises a mouthpiece and breath-actuation means which prevents dispensing from the reservoir until a patient inhales through the mouthpiece, and,

(ii) a protective casing surrounding the breath actuated inhaler, the casing comprising a body portion and a moveable cover which may be displaced to allow a patient access to the mouthpiece to use the breath-actuated inhaler whilst it is within the casing, the breath-actuated inhaler being removable from the protective casing and operable outside the casing.

The present invention provides a cover arrangement which primes the inhaler for use upon opening the cover.

According to the present invention there is provided

(i) an inhaler including a housing which comprises a mouthpiece and actuation means to prevent dispensing from the inhaler until a patient is ready to inhale through the mouthpiece, and,

(ii) a protective casing surrounding the inhaler, the casing comprising a body portion and a moveable cover which may be displaced to allow a patient access to the mouthpiece to use the inhaler, causing relative movement of the inhaler and a blasting means within the protective casing thereby cocking the inhaler ready for use, in which, the cover is pivotally attached to said casing and a cocking link is pivotally mounted at one end to the cover and has a portion in pivotal engagement with the inhaler or blasting means, whereby opening of the cover causes movement of the cocking link and inhaler relative to the blasting means, such that the pivot points of the cocking link and the pivot point of the cover to the casing pass through a straight line position to an overcentre position at which the inhaler is cocked.

The cocking link provides a simple, robust and effective method of priming an inhaler for use, by co-ordinating the act of opening the casing cover with cocking of the inhaler mechanism.

Preferably the cocking mechanism includes guide means to define the movement of the portion of the cocking link engaging the inhaler or blasting means. Generally, the cocking link includes at least one guide arm, typically two, engaging a suitable slot or recess in the body portion of the casing. Thus, the direction and extent of movement of the cocking link portion (and therefore the inhaler or blasting means) is partly defined by both the direction and length of the recesses. In a preferred embodiment the cocking link comprises a wishbone bracket having two arms, each arm engaging a corresponding guide recess in the body portion of the protective casing. The cocking link preferably acts directly on the inhaler.

The cover arrangement of the invention may be used with known metered dose or breath actuated pressurised inhalers. For a conventional pressurised inhaler comprising a cylindrical aerosol vial containing propellant and medicament and equipped with a dispensing valve, the inhaler is intended to be used in a substantially vertical position, ie which the valve is lowermost relative to the vial. The cover may either be pivoted about a point lower than the inhaler, or about a point above the inhaler. Movement of the inhaler is generally completed in a substantially vertical direction, along the axis of the inhaler. The cover arrangement may also be used with dry powder devices which require priming prior to use by the patient.

The cover arrangement of the invention is found to possess a number of advantages, e.g.:

(a) access to the aerosol dispenser and removal of the same, for cleaning purposes, freeing stem obstructions etc., is readily and simply effected without disassembly of the device;

(b) the cover when fully closed provides an effective seal restricting the ingress of contaminants, e.g., dirt or moisture;

(c) the cover is stable in the fully open position avoiding any tendency to close during use;

(d) when fully open, the cover is far removed

from the proximity of the users facial extremities, and is resistant to breakage at the mounting point resulting from accident or clumsy handling, and,

(e) movement of the inhaler within the casing is completed in a straight line substantially free of obstructions and with reduced likelihood of jamming.

The invention will now be illustrated with reference to the accompanying drawings in which:

Figures 1 to 5 represent an inhalation device comprising a medical inhaler having a protective outer casing incorporating a cocking mechanism in accordance with the present invention;

Figures 1 and 4 illustrate sections through the device with the moveable cover in the closed position and the inhaler uncocked;

Figures 2 and 3 illustrate sections through the device with the moveable cover fully open and the inhaler cocked for use,

Figure 5 illustrates a front view of the device in the cocked position of Figures 2 and 3, and

Figures 6 and 7 represent partial sections through the protective casing of a device in accordance with the invention which is adapted to accommodate aerosol dispensers of different size.

The aerosol dispenser is omitted in Figures 1 to 3 to more fully illustrate the cocking mechanism.

Referring to Figures 1 to 3 an inhalation device comprises a protective casing (1) adapted to receive a breath actuated aerosol dispenser, which casing comprises a body portion (2) and moveable cover (3). Casing (1) defines a chamber (4), in which the aerosol dispenser (omitted for purposes of clarity) is located. Cover (3) is pivotally mounted about (5) allowing the patient to convert the device from an inactive closed format, in which the cover is in a horse position (as depicted in Figures 1 and 4), to an open format in which the cover is fully displaced (as depicted in Figures 2, 3 and 5). The act of opening cover (3) provides the cocking force for the aerosol dispenser and allows the patient access to a suitable portal, such as a mouth or nasal adaptor, through which medicament may be inhaled. The inhaler is maintained in the closed format while not in use providing a compact, convenient shape minimising contamination from dirt and moisture ingress etc. Cover (3) is advantageously provided with a snap fit (6) to positively retain the cover in its closed position.

The cocking mechanism comprises a wishbone bracket (7) which pivots about (8) on cover (3), such that opening of cover (3) drives bracket (7) from a home position (depicted in Figure 1) to a fully displaced position (depicted in Figures 2 and 3). The direction and extent of bracket displacement is defined by the engagement of bracket arms (9) and (10) with housing recesses (11) and (12) respectively. Recesses (11) and (12) are oriented such that displacement of cover (3) drives the bracket in a direction along the longitudinal axis of both casing and inhaler (represented by arrow 'A').

Referring to Figures 4 and 5, the aerosol dispenser (13) is located within chamber (4) by the provision of a groove (14) on the surface of dispenser (13) which pivotally engages the upper surfaces (17,18) of wishbone bracket arms (9) and (10) respectively, such that the aerosol container abuts against cocking spring (15), thereby stably seating the dispenser.

In use, the device is held in the hand such that the longitudinal axis of the body portion approximates to the vertical. Full displacement of cover (3) displaces bracket (7) to tilt the dispenser in a straight vertical path, without any rubbing contact with the internal surface of the body portion, thereby compressing cocking spring (15). Subsequent relaxation of spring (15) upon device actuation, i.e. patient inspiration, provides the necessary force for displacing the aerosol vial relative to the outlet valve chamber. In an alternative embodiment, cocking spring (15) may be replaced by a deformable elastic member.

Body portion (1) and groove (14) are configured such that unwanted movement of the dispenser is prevented during device inversion. For example, body portion (1) may be provided with one or more longitudinal spacer ribs (not shown) which project from the inner body surfaces to restrict lateral movement of the dispenser during day to day transport or accidental dropping by the user.

The dispenser may be removed for cleaning, freeing stem obstructions or replacement of a new aerosol vial upon exhaustion of the old, by the user simply lifting the dispenser against spring (15), sufficient to disengage groove (14) from bracket arms (9) and (10) and withdrawing the dispenser through the cover opening.

The extent of bracket displacement and hence lift imparted to the dispenser is proportional to the extent of the initial opening of the cover. Maximum dispenser lift and therefore spring compression is completed by displacing the cover through about 150°, whereas fully opening the cover requires a displacement of about 185°. The user thus senses a stepped movement when displacing the cover. During the first 150° of displacement the cover works to compress the spring which reaches a maximum when pivot point (9) passes through a straight line position defined by the upper surface (17) of bracket arm (9) and pivot point (5) (illustrated by dotted line 5; Figure 5), to an overcentre position at which the device is cocked.

The device may then be converted between

two stable formats; (a) fully closed and (b) fully open. Any intermediary position for cover opening is inherently unstable, such that the casing will tend towards either of the stable formats, depending on which side of the 150° stop the cover presently lies. This prevents the cover from inadvertently snapping shut on the user's facial extremities once fully opened and allows the cover to be far removed from obstructing the patient's chin. Additionally, the device is configured such that cover (3) abuts a stop (16) to provide greater resistance to breakage at the pivot of cover and housing as a result of mishandling or accidental dropping of the device.

The relative positions of the pivot points (5) and (10,9) allows the cover (3) to be stepped such that, when the cover is closed, the protective casing fully envelopes the inhaler restricting the ingress of contaminants.

Figures 6 and 7 of the accompanying drawings illustrate a breath-actuated inhaler in accordance with the invention in which the protective casing (34) may be modified to accommodate aerosol vials of different sizes. The body portion (36) of the casing has an aperture (30) through which a shroud (32) extends which accommodates the aerosol vial (not shown). A series of shrouds (32) may be fabricated having different lengths and, possibly, internal diameters. In order to accommodate various sizes of aerosol vial.

Whilst a cocking spring may be positioned within the top of the shroud (32) (in a similar manner to the cocking spring (15) shown in Figure 4), to absorb and retain the cocking force applied when the cover (3) is opened, a cocking spring external of the shroud (32) may be employed. The shroud (32) is provided with a flange (34) and cocking spring (35) is positioned around the shroud (32) extending between the flange (34) and a stop (38) at the top of the protective casing (36). When the cover (3) is opened, the breath-actuated inhaler, together with the shroud (32) is lifted (Figure 7) compressing cocking spring (35). When the patient breathes through the mouthpiece, the breath-actuated mechanism is triggered moving the shroud (32) and aerosol vial down-wards to fire the aerosol valve.

In a further embodiment of the invention (not illustrated in the drawings) the shroud (32) shown in Figures 6 and 7 may be dispensed with and replaced by a circumferential flange extending around the aerosol vial, equivalent to flange (34), against which cocking spring (35) will act. The circumferential flange may be fabricated as a snap-on component around the aerosol vial e.g., in the region of the neck of the vial. This arrangement will obviate the need for fabricating a series of shrouds to accommodate the different sizes of aerosol vial, since the aerosol vial will simply extend through the top of the protective casing.

Claims

1. An inhalation device comprising:
(i) an inhaler including a housing which comprises a mouthpiece and actuation means to prevent dispensing from the reservoir until a patient is ready to inhale through the mouthpiece, and,
(ii) a protective casing surrounding the inhaler, the casing comprising a body portion and a moveable cover which may be displaced to allow a patient access to the mouthpiece to use the inhaler, causing relative movement of the inhaler and a blasting means within the protective casing thereby cocking the inhaler ready for use, characterised in that the cover is pivotally attached to said casing and a cocking link is pivotally mounted at one end to the cover and has a portion in pivotal engagement with the inhaler or blasting means, whereby opening of the cover causes movement of the cocking link and inhaler relative to the blasting means, such that the pivot points of the cocking link and the pivot point of the cover to the casing pass through a straight line position to an overcentre position at which the inhaler device is cocked.

2. An inhalation device as claimed in Claim 1 in which the cocking link portion is in pivotal engagement with the inhaler.

3. An inhalation device as claimed in Claim 1 or Claim 2 in which the inhaler comprises an aerosol vial containing propellant and medicament and equipped with a dispensing valve.

4. An inhalation device as claimed in Claim 1 or Claim 2 in which the inhaler comprises a dry powder inhaler.

5. An inhalation device as claimed in any preceding claim in which the device includes guide means to define the direction of movement of the portion of the cocking link engaging the inhaler.

6. An inhalation device as claimed in Claim 5 in which the cocking link includes at least one guide arm engaging a slot or recess in the protective casing to define the direction of movement of the portion of the cocking link engaging the inhaler.

7. An inhalation device as claimed in any preceding claim in which the cocking link comprises a wishbone bracket having two arms, each arm engaging a guide recess in the body portion of the protective casing.

8. An inhalation device as claimed in any preceding claim in which the movement of the inhaler is in the axial direction of the inhaler.

9. An inhalation device as claimed in any preceding

claim in which the movable cover pivots through at least 150° to the fully open position.

10. An inhalation device as claimed in any preceding claim in which the inhaler comprises a cylindrical vial and dispensing valve intended to be used in a substantially vertical position with the valve lowermost.

11. An inhalation device as claimed in any preceding claim in which the cover is shaped such that when the cover is closed the protective casing completely envelopes the inhaler restricting the ingress of contaminants.

12. An inhalation device as claimed in any preceding claim in which the inhaler is breath actuated.

13. An inhalation device as claimed in any preceding claim in which the blasing means is selected from a compression spring or a deformable elastic member.

14. An inhalation device as claimed in any preceding Claim in which the inhaler comprises an aerosol vial and the protective casing comprises a shroud surrounding the aerosol vial.

15. An inhalation device as claimed in Claim 14 in which the shroud is movable within the remainder of the protective casing and spring biased to urge the aerosol vial towards a firing position.

16. A protective casing for an inhaler, which casing comprises:

(a) a body portion defining a chamber adapted to house an inhaler therein, the chamber including blasing means for cocking said inhaler, and,

(b) a movable cover which may be displaced to allow a patient access to said inhaler, characterised in that the movable cover is pivotally attached to the casing, and a cocking link is pivotally mounted at one end to the cover and has a portion adapted to provide a pivotal engagement with said inhaler or blasing means, wherein the casing is constructed and arranged such that opening of the cover causes movement of the cocking link and inhaler relative to the blasing means, in which the pivot points of the cocking link and the pivot point of the cover to the casing pass through a straight line position to an overcentre position, which movement may be used to cause relative movement between the inhaler and blasing means, thereby cocking the inhaler.

17. A protective casing as claimed in Claim 16 having one or more of the features as claimed in any one of Claims 1 to 15.

18. A protective casing as claimed in Claim 16 substantially as herein described with reference to the accompanying drawings.

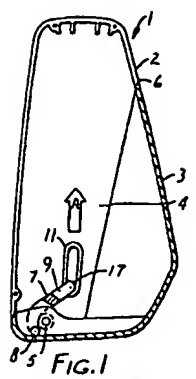

FIG.1

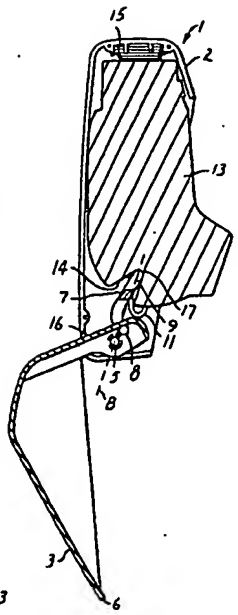

FIG.5

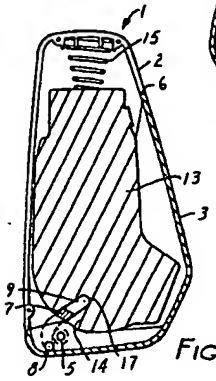

FIG.4

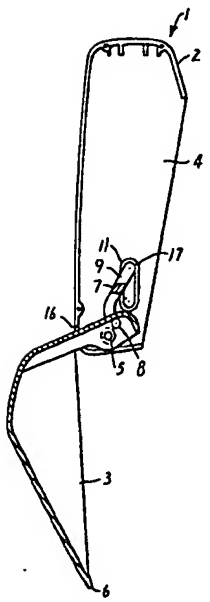

FIG.2

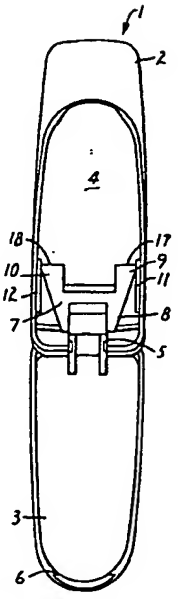

FIG.3

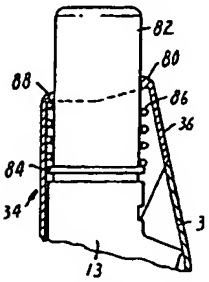

FIG.6

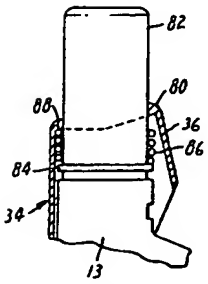

FIG.7

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 31 2376

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	FR-A-2 059 300 (ROXER LAB. INC.) * Page 2, lines 13-22; page 10, lines 10-35 *	1,18	A 61 M 1/00
A	DE-A-1 917 012 (REXALL) * Page 6, lines 3-8; page 7, last paragraph *	1	
A	FR-A-2 558 548 (GLAXO GROUP LTD) * Page 4, lines 18-35 *	1,18	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

A 61 M
B 65 D

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	07 January 91	GERARD B.E.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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